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Strength Renewed, a Grand Old Building Is Back

By KIRK JOHNSON
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SALT LAKE CITY — When engineers began poking and prodding at the Utah Capitol a few years ago, sounding the structure for how it might fare in the earthquake that seismologists say will surely strike here one day, they grew increasingly scared as they moved higher toward the dome.

Ramin Rahimian for The New York Times

The Utah State Capitol, shut in 2004 for a restoration and earthquake-resistant retrofit, was opened again this month.

Photographs by Ramin Rahimian for The New York Times

An anti-seismic bearing now installed under the building.

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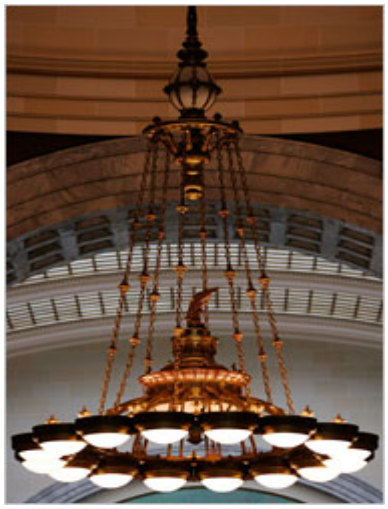
A mural depicting Brigham Young arriving the Salt Lake Valley.



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The Capitol's newly restored chandelier.

The quality of the concrete varied — solid at the foundation, crumbling near the top — and that finding could mean only one thing: There had been only so much building material, and construction crews, in finishing the dome in 1916, had added more and more water to stretch out what they had.

“It was frightening: we got up there and said, ‘There’s nothing here,’ ” recalled David H. Hart, an architect and the executive director of the Capitol Preservation Board, which led the $200 million project, completed just this month, to assess and retrofit the Capitol. “We did core samples and came up with rubble.”

Every grand old public building has its back story, and as often as not, it comes around to just such a mix as this one, where grandiose ambition and real-world execution meet, where a skyward reach toward some higher purpose or statement — the spirit of democracy, faith, you name it — is bound up with human imperfection, as well as a yearning for acceptance.

Utah's top-to-bottom seismic retrofit focused on the large and the small. To make the building safe and at the same time restore it as much as possible while keeping with its original design meant understanding everything about it and about the moment of its creation in politics and Utah culture. Where the granite facade and the marble pillars came from (a local canyon for the granite, Georgia for the marble) was as important as the engineering decisions (sometimes brilliant, sometimes not so much).

The 320,000-square-foot building, the architectural-engineering team realized, would probably collapse in an earthquake as severe as one of magnitude 7.0, which could happen anywhere at any time along the 240-mile Wasatch Fault, running north to south through Utah's most densely populated corridor. The fault shifts with a big tremor every 350 years or so on average, and the last one was in 1600.

The weak concrete at the top was only one problem. The marble pillars would topple, supported beneath as they were by bricks that would crumble to dust, and the gray granite exterior, attached to the building mainly by its own weight, would slough off like a snake's skin in a molt. The giant dome would plummet into the rotunda below.

So the building shut down in 2004, the state's legislators taking up temporary quarters, while the retrofit team adopted a combination of answers. Some of those answers were tried and true — the San Francisco City Hall was one model — but some, to the team's knowledge, had never been attempted anywhere in the world.

To understand the most innovative part, envision the Brooklyn Bridge at rest in a basement. Four small suspension bridges, complete with towers and cables like those on the span across the East River, are now encased inside the Capitol's subbasement understructure.

The bridges, each 14 feet high, 12 feet wide and about 45 feet long, redistribute the 30-million-pound weight of the dome, which had rested on four giant concrete footings, onto 44 smaller steel and rubber devices called isolator pads. That in turn will allow the dome and the rest of the building to shimmy and sway in conjunction with each other when the big quake comes. In a 7.0 quake, engineers say, the building can now move harmlessly up to two feet from side to side, undulating on the isolator pads like an elephant doing the hula.

"I know of nothing that's ever been done quite like this, in this combination," said the project's chief engineer, Jerod G. Johnson.

In addition to structural challenges, the project touched on a poignant historical moment.

When Utah became a state in 1896, it was emerging from a period of isolation and alienation from the rest of the country that other Western territories never knew. Its settling by Mormons in the 1840s — and the practice of polygamy, ended by the church in 1890 — had made Utah a place apart: pariah to some, promised land to others.

The Capitol, begun in 1912, was a statement of emergence into the mainstream, and historians say people here were acutely conscious of the moment. The vigorous public debate over whether the exterior should be granite or marble, for example, took six months to resolve.

It is no coincidence, historians say, that of all the state capitols, Utah's is probably the one closest in design to the United States Capitol. The mood here, strongly felt, was that Utah was finally America, no longer so different — and, just as crucially, no longer wanting to be seen as different.

"Utah had gone through such a long and drawn-out fight for statehood," said the state historian, Kent Powell. "The Capitol building was a statement that we'd arrived."

The Gold Room, a formal reception area on the building's south side, captured the mood of declaration and diffidence. From its French fabrics to its Russian furniture, it was European to its core: a borrowing of royalist, imperialist pretense, a mini-Versailles in the City of the Saints.

"They were tired of being this quote-unquote Mormon community out in the West that nobody loves," said Mr. Hart, the Capitol preservation official. "When a dignitary showed up, they wanted them to see this as as fine a space as anything you find in New York City or anywhere else."

As the retrofit progressed, the Gold Room required trade-offs. The architects insisted that the room be kept intact: no reinforcing cement, no stripping of the walls or the irreplaceable plaster. That meant finding rooms on the opposite side of the Capitol that would also be left as they were, to maintain the delicate balance and symmetry of the building with its new weight, and with its old freight of meaning and space.